

Continuous-time portfolio selection in presence of estimation risk: A sparse plug-in strategy approach

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We consider an investor who faces parameter uncertainty in a continuous-time financial market. We model the investor's preference by a power utility function leading to constant relative risk aversion. We show that the loss in expected utility is large when using a simple plug-in strategy for unknown parameters. We also show that the loss due to estimation depends crucially on the coefficient of relative risk aversion. We provide theoretical results that show the trade-off between holding a well-diversified portfolio and a portfolio that is robust against estimation errors. To reduce the effect of estimation, we constrain the weights of the risky assets with an L_1 -norm leading to a sparse portfolio. We provide analytical results that show how the sparsity of the constrained portfolio depends on the coefficient of relative risk aversion. Based on a simulation study, we demonstrate the existence of an optimal bound on the L_1 -norm, for each level of relative risk aversion.